BREEDING OF SPOTTED OWLET *ATHENE BRAMA* IN NEST BOXES AND CONSERVATION ASPECTS

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Research and monitoring schemes of birds have shown that the declining species in Asia and Europe are mostly those which are connected to farmland. The use of insectivorous birds like Spotted Owlet *Athene brama* as bio-control agents is beneficial, both economically as well as ecologically, in controlling rodent and insect pests. To combat the decline and to conserve beneficial bird species, there is a mandate for testing and evaluation of wooden nest boxes for Spotted Owlet and other beneficial species under the All India Network Project on Agricultural Ornithology. In the present study, we have designed and standardised wooden nest boxes for Spotted Owlet in field areas of Punjab Agricultural University Campus, Ludhiana. The observations on breeding in the nest boxes were recorded for two years in relation to nesting sites which are discussed. This farmer-friendly technology needs to be implemented around the villages to reverse the decline of such beneficial bird species.

Key words: wooden nest boxes, egg shape index, Spotted Owlet, bio-control agent

INTRODUCTION

Agricultural intensification has many aspects like mechanization, increasing use of pesticides and fertilizers. Research and monitoring schemes of birds have shown that the declining species in Asia and Europe are mostly species which are connected to the farmland (Ahnstrom *et al.* 2008; Siriwardena 2010). Intensive agriculture and agriculture related development activities in Punjab have adversely impacted many species of birds decrease in abundances of insectivorous/ predatory birds, which correspondingly has resulted in increased insect and rodent pest problems to crops (Parasharya *et al.* 1994). The use of insectivorous birds like Spotted Owlet *Athene brama* as natural bio-control agents is beneficial both economically as well as ecologically in controlling rodent and insect pests. The Spotted Owlet is widely distributed and the most common of all the owls in India (Ali and Ripley 1983). The Spotted Owlet consumes mainly insects and small mammals; whereas Barn Owl *Tyto alba* and other species of owls eat birds, lizards, and amphibians. Although some information is available about the Spotted Owlet's food habits, less is known regarding its nesting, roosting, breeding, courtship, and mating habits (Ahmed 2010; Kler 2003; Mahmood-ul-Hassan 2008; Pearson 2003). Compared to other owl species, nests of Spotted Owlet are easy to locate as they roost close to their nests during the day and emit loud calls when disturbed. They usually remain inactive during the day, unless disturbed by an intruder, and become active at dusk. Our knowledge of the ecology of Spotted Owlet with reference to our agro-ecosystem is highly fragmentary and incomplete. Knowledge of species feeding, ecology, and reproductive biology is essential to understand its population dynamics, and to resolve related conservation issues (Clark *et al.* 2011; Narang and Lamba 1984; Robert *et al.* 2011).

To combat the decline and to conserve beneficial (to farmers) bird species, there is a mandate for testing and evaluation of wooden nest boxes for Spotted Owlet and other species under the All India Network Project on Agricultural Ornithology. Supplementing natural tree cavities with wooden nest boxes has been used as a conservation strategy for many obligate tree-hole, cavity, or secondary cavity nesters, with success in halting or even reversing population decline (Malaza 2010; Sengupta 1976; US Fish & Wildlife Service 2008, 2012). The Spotted Owlet uses tree cavities, cracks, and recesses in building walls, rocks, and cliffs for nesting and is strongly associated with agricultural landscapes.

The present study provides some data on the breeding biology of Spotted Owlet in wooden nest boxes installed at the agricultural field area of Punjab Agricultural University, Ludhiana during 2010–2011.

MATERIAL AND METHODS

The study was carried out in the campus of Punjab Agricultural University (PAU), Ludhiana (30° 56' N; 75° 52' E; 247 msl) during 2010-2011. The campus has a large stretch of agricultural fields, orchards, woodlands, and fish and poultry farms, in addition to a number of buildings.

Fig.1: Spotted Owlet occupying the nest boxes

This study to standardise the use of wooden nest boxes by birds (species-wise) is being conducted for over six years at different locations: farmlands and research fields. A total of 62 artificial wooden nest boxes were installed at six different locations, i.e., agro-forestry area, agricultural fields with tree line, vegetable farms-cum-orchards, fodder-cum-orchard area, vegetable farm and poultry farm of the University. These were categorised into four habitat types, i.e., agriculture field (A), agricultural field with tree line (B), small vegetable fields (C), and agro-forestry area (D). These nest boxes were installed at heights ranging from *c.* 2.5 to 6 m on the trunk as well as branches of trees in the study area (Fig. 1). Preference was also recorded for nest visibility (%), tree type (deciduous / evergreen) and habitat types A to D.

Each box measured 30 cm deep, 23 cm wide with an opening of 7.5 cm at a height of 12.7 cm in front, and a lid of 25 cm x 32 cm with two hooks for fixing the box on a tree. The nest boxes were reinstalled and/or cleaned in September in 2009 and 2010, giving the birds ample time to explore possible nesting sites before the onset of the breeding season, and to become accustomed to these wooden nest boxes in their environment.

RESULTS AND DISCUSSION

Of the 62 nest boxes installed, 10 were occupied by the Spotted Owlet. Nest boxes were monitored once/twice a week before egg-laying and on every 2nd or 3rd day during the egg-laying period (Tables 1, 2). In two cases, the Spotted Owlet was observed occupying nest boxes previously occupied by Common Myna *Acridotheres tristis* using the nesting material of the myna. The nesting material comprised small pieces of polythene and a few feathers in some of the nest boxes. In one instance, eggs were laid twice in a box; it could not be determined if the same breeding pair had reared the second clutch.

A total of 35 eggs and 15 young were recorded during this study (Figs 2, 3). The dimensions of 21 eggs were noted and this formed the basis of further analysis. The clutch size ranged from 2–4 and mean egg measurements were: width 26.41 mm, length 31.25 mm, and weight 11.923 gm. The minimum and maximum values of egg parameters were width (24.01 mm and 28.29 mm), length (29.01 mm and 34.56 mm) and weight (9.012 gm and 14.103 gm). The mean Egg Shape Index (ESI) was 84.662. Jadhav and Parasharya (2003) reported the average egg size of Spotted Owlet in nest box as 30.9 x 26.3 mm at Anand, Gujarat. A previous study at Punjab Agricultural University (PAU), Ludhiana (Kler 2004), on the breeding of Spotted Owlet in nest boxes had shown that the clutch size, average egg size, incubation period and nesting period was 3, 31.20 x 26.68 mm, 21 days, and 28–29 days, respectively. The average egg size (31.25 x 26.41 mm) recorded during the present study was comparable with the previous work at PAU Campus, Ludhiana. Incidence of predation was observed. Of the total 35 eggs, 16 eggs went missing, while 4 eggs failed to hatch. Failure of egg incubation may be attributed to improper incubation. There were noticeable changes in chick plumage 10 days after hatching. The 15 day old nestlings had greyish-brown plumage with whitish spots, while the inner parts were mostly white with

Table 1: Detailed description of four artificial nest boxes occupied by Spotted Owlet *Athene brama* at different sites in PAU field area during in 2010

Sr. No.	Site	Tree	Height of the box	Direction of opening of nest box	Tree Canopy Open (O)/ Closed (C)	Deciduous (D)/ Evergreen (E)	No. of clutches	No. of eggs	No. of young	No. of eggs predated	No. of eggs failed to hatch	Total no. of nest boxes installed at site	Area type*
1	I	Eucalyptus	6.09	N	O	E	1	3	3	0	0	4	A
2	II	Eucalyptus	5.48	NW	O	E	1	2	2	0	0	4	A
3	III	Dek	4.57	S	O	D	2	6	1	5	0	6	B
4	IV	Tahli	3.65	N	O	E	1	3	2	1	0	12	A

Table 2: Detailed description of six artificial nest boxes occupied by Spotted Owlet *Athene brama* at different sites in PAU during 2011

Sr. No.	Site	Tree	Height of the box	Direction of opening of nest box	Tree Canopy Open (O)/ Closed (C)	Deciduous (D)/ Evergreen (E)	No. of clutches	No. of eggs	No. of young	No. of eggs predated	No. of eggs failed to hatch	Total no. of nest boxes installed at site	Area type*
1	I	Dek	5.18	W	O	D	1	4	0	4	0	6	A
2	Ii	Lasura	3.96	E	O	E	1	3	3	0	0	10	B
3	Iii	Dek	4.57	NW	O	D	1	4	4	0	0	5	B
4	IV	Jamun	4.57	NE	C	E	1	2	0	2	0	5	B
5	V	Dek	5.48	E	C	D	1	4	0	4	0	5	C
6	VI	Dek	3.65	E	C	D	1	4	0	0	4	5	B

* Area type: A = Agricultural field
B = Agricultural field with tree line
C = Small vegetable fields

Fig. 2: Eggs of Spotted Owlet in the nest box

dark brown specks. The fully grown chicks flew out of the nest when they were 28–29 days old. Kler (2004) had reported aggression of the parent bird towards the observer, which was not encountered in this study.

The incidence of predation ranged from 0–100%. Of the 10 boxes occupied by the Spotted Owlet, two nests had 33.3% and 83.3% egg predation, four nests had 0% egg predation, three nests had 100% egg predation, and in one nest all eggs failed to hatch. Overall, the incidence of egg predation, successfully hatched eggs, and incubation failure were 45.71%, 42.83%, and 11.42%, respectively. House Crow and Common Myna were observed hovering around or pecking at nest boxes. The breeding success was 57.14% in 2010, 71.42% in 2011, and overall breeding success during the study period was 64.28%. Average height of nest boxes occupied by the Spotted Owlet was 4.7 m.

Of the 10 boxes occupied by Spotted Owlet, five were on Dek (*Melia azedarach*), two on Eucalyptus (*Eucalyptus citriodora*) and one each on Tahli or Sheesham (*Dalbergia sissoo*), Jamun (*Syzygium cumini*), and Lasura (*Cordia myxa*). Open canopy was favoured by 70% of the occupants, compared to closed canopy (30%). Equal preference was observed for deciduous and evergreen trees. Nest box occupation was 50% for type B, 40% for type A, 10% for type C and 0% for D type. Type B habitat consisted of fields with multiple cropping patterns (2–3 seasonal crops per year)

Fig. 3: Young of Spotted Owlet in the nest box

and supported diverse animal/insect fauna. Easy availability of food leads to a preference for type B habitat. Incidentally, at three locations, two nests of Common Myna and one nest of Night Heron (*Nycticorax nycticorax*) were observed on the same tree occupied by the Spotted Owlet.

Ten wooden nest boxes each were also installed at farms in village Mehalkhurd (district Barnala) and village Bhattian (district Gurdaspur). Spotted Owlet was recorded breeding in two boxes installed on a Dek tree about 5 m above the ground at Bhattian village. Clutch size was 3; ESI was 85.302.

The findings suggest that the Spotted Owlet's ability to suppress insect and rodent activities could be used for management of pest populations of agro-ecosystems, resulting in ecological and economic benefits, and as alternative to chemical pesticides. Inversely this farmer-friendly technology needs to be implemented at the village level to reverse the decline of such beneficial bird species.

ACKNOWLEDGEMENTS

The authors are highly thankful to ICAR, New Delhi, for providing financial assistance and other facilities to carry out the research work. The assistance and help rendered by the laboratory staff is duly acknowledged.

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